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Whale-Oil Soap Insecticide Washes.

Among the ingredients of insecticide washes intended for summer use, or on evergreen trees, whale-oil soap is one of those most commonly employed, as well as most generally approved, in California. It is quite effective in numerous cases, even when used by itself; but it is most commonly combined with, or made the vehicle for, other insecticide substances. Instead, common soft soap is also employed, but its chief merit lies in the fact that it, in common with other soapy compounds, serves to conserve the efficacy and maintain the action of other insecticides for which it serves as a vehicle. This it does partly by virtue of its property of promptly wetting even hairy, greasy or polished surfaces (whether of leaves or insects), from which simple water would rebound or gather in ineffective droplets; partly because it remains more or less moist, and in that condition forms a soft, clinging varnish under which the action even of volatile agents (such as kerosene or the extract or powder of "buhach") can continue for some time without too much wasting of their strength into the surrounding air, by evaporation.

But whale-oil soap possesses the additional advantage of having, within itself, special odorous substances of insecticide qualities, which impart to crude whale-oil its intensely disagreeable odor. From these it is partly freed, in the refining process, by the action of a certain proportion of caustic alkali (mostly soda), which takes possession *preferably* of the odorous compounds of the crude oil, together with a certain proportion of the inodorous fat oil. This soapy mixture constitutes the "foots" of the refineries, and is far more energetic in its insecticide effect than soap made from the *whole* of the crude oil, which contains a relatively much smaller proportion of the evil-smelling substances.

This fact alone explains much of the diversity of opinion that has arisen in the matter of proportioning the strength of the soap washes to the desired effect. For not only has the soap made from the *whole* oil been supplied by some manufacturers, but those using the washes have, in many instances, made the soap themselves, in accordance with the common process of making soft soap at home.

Matthew Cooke, in his excellent book on the repression of injurious insects, prescribes that one pound of the soap dissolved in one gallon of water shall constitute the basis of the washes. Some have found this wash unnecessarily strong, while others have found it too weak to accomplish anything.

In a bulletin issued in February last (No. 52) were given the analyses of sundry brands of "lye," from which it appeared that they differ in strength as much as 500 per cent; so that a person using the proportions prescribed for one kind, would, in using the other, make his wash too strong or too weak, as the case might be, to that precise extent; either wasting his work or perhaps scorching his trees.

An examination of the several brands of whale-oil soaps in the San Francisco market has revealed similar differences between them. In this case the inert substance present to excess in some samples is simply water, which was found to range, in different preparations *sold at the same price*, from 21 to as much as 82½ per cent. Curiously enough, the most highly watered article was among the most salable; the reason being, probably, that while the article having nearly 80 per cent of soap and 20 of water is somewhat difficult to dissolve and has to be boiled, the one in which these proportions are reversed can be made into a wash by simply stirring it into cold water. But apart from this inconvenience, the one is actually and indisputably worth fully four times as much as the other, for the purpose it is intended to subserve; provided that the user will take the trouble to put in the water himself, instead of having it shipped to him from San Francisco.

It is no wonder that the experience of fruit-growers differs widely as to the efficacy of whale-oil soap in ridding their trees of insect pests!

From a comparative examination of the samples on hand, it appears that a whale-oil soap containing about 50 per cent of water is as readily dissolved as any moderately energetic fruit-grower need desire; and, in view of the relatively small weights of invoices usually shipped of this article, I suggest that it would be convenient to users, if all manufacturers would adopt the standard of 50 per cent of dry soap to be contained in whale-oil soap, as offered for sale. There will then be some definite meaning to the prescription of "a pound to the gallon," and disapointments after the proper use of washes prepared according to the best experience will cease to occur.

The Sulphuring of Vines.

A number of letters making inquiries regarding the proper time and mode of using sulphur for the prevention or repression of mildew on vines, suggest the propriety of a summary statement of the subject, for the general benefit of those interested.

The first question asked is whether sulphuring should or may be done while the vine is in bloom. There is much contradictory evidence on this subject. From an outside point of view it seems undesirable to place an antiseptic, intended for the destruction of minute vegetable life, in immediate contact with the extremely delicate tissues of a flower in process of fructification. The action of the pollen on the pistil itself involves a process of genuine growth, which cannot be supposed to be favorably influenced by the presence of an agent hostile to other vegetable life. Still, as in the case of the buhach or insect powder, which, however fatal to fleas, is innocuous to man, it is possible that what is very deadly to a minute organism like mildew may pass harmlessly by even the delicate stigma and pollen tubes of the larger vine. No special warning in the premises is given in the latest European and American works on viticulture, and it must be presumed that no obvious or constant bad effects have been noted from sulphuring blooming vines. It is true, however, that elsewhere the time for sulphuring is usually very much later than is found necessary in some parts of California, where mildew often starts in May; hence, perhaps Californian experience on the subject is more extensive, and it is somewhat conflicting.

Decided injury has been reported in some cases; in others it has been noted that vines sulphured during bloom have "set" fruit abundantly, while others close at hand and not sulphured have been subject to *coulure* to a damaging extent. In such cases it must be inferred that the *coulure* was due to a fungous parasite which was at work on the bloom, and which was suppressed where sulphuring was done, but was permitted to do its work where the antidote was omitted.

As regards the reported cases of obvious damage from sulphuring into the bloom, some clue to its possible causes was afforded by the examination of a collection of samples of commercial sulphur exhibited at a late meeting of the Santa Clara Viticultural Society. Among eight samples of California ground sulphur there were three that possessed a strongly acid taste on the tongue, evidently from the presence of sulphuric acid. It is quite certain that if any sulphur so contaminated were introduced into an open grape flower it would effectually destroy the vitality of any pollen or pistil touched by it. No such acidity was perceptible in any of the samples of French (sublimated) sulphur exhibited at the same time, although one would more reasonably expect to find it there than in ground sulphur, in view of the usual modes of production.

Considering the whole of the facts before us, I would advise that sulphuring should be done *before* or *after* bloom rather than *during* the same; and that all sulphur used at such time, especially, be carefully tested on the tongue to ascertain whether or not it contains a perceptible amount of acid. All such should be discarded from any use whatsoever in the vineyard.

Regarding the mode of application, I have previously given my reasons for preferring to have sulphuring done while the leaves are moist with dew. The powder then remains adherent to the leaves instead of being blown away by the first wind; and thus the disinfecting action is maintained for a length of time as it is necessary it should be, since the effect is not instantaneous, but depends upon the gradual formation of sulphur vapor. The latter is formed more or less at all ordinary temperatures, as is obvious from the well-known odor which is especially striking when a sulphured vineyard is under hot sunshine. There is not, as has been erroneously stated, any *combustion* under these conditions, and therefore no generation of the "sulphurous gas" which serves as a disinfectant in wine cellars. Moreover, any particles of sulphur lodging on the soil and becoming mixed with it become useless so far as the formation of sulphur vapor is concerned, because that vapor is promptly absorbed by the soil. Only relatively large masses of sulphur falling on the ground can exert any effect on the vine; but whatever lodges on the head or in the crotches of the stock will, to the extent of its surface exposure, contribute to the formation of the disinfecting vapor. The most economical and effective use is, after all, the even dusting-over of the moist leaves, on which the particles will remain fixed until evaporated. For young vines the dredge is most convenient; on older ones the bellows having a positive provision for agitating the sulphur powder within is preferable; without such provision the distribution is very uneven and wasteful.

As regards, finally, the choice between ground and sublimated (French) sulphur, the two are doubtless of equal efficacy when made equally fine, and, while differing considerably in price for equal *weights*, there is really little difference in the cost of equal *bulks*, which is the practical basis of comparison. Both the touch and the microscope show that the ground sulphur is prevalently much coarser than the sublimated, and the large, smooth, shining fragments of the former roll off and are blown away from the leaves much more easily than the minute, rough, roundish grains of the sublimated. Of course, the latter could be prepared in California just as well as in France; and, judging from the samples lately examined, it would when so made be more certain of not containing injurious ingredients than is some of the sulphur now offered, which has probably been made from crude, natural volcanic material, instead of such as has been purified by previous melting from the acid with which it is almost always contaminated. Arsenic is another common impurity of native sulphurs, and would be very objectionable in an application to a blooming vine.

E. W. HILGARD.

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